Toying with Science

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In Bangalore recently for a workshop organised by Sutradhar for primary school teachers teaching science, Arvind Gupta spoke to Veena Pradeep.

He has a B.Tech degree from IIT Kanpur and has been working at the Children's Science Centre of the Inter-University Centre for Astronomy and Astrophysics, Pune, since October 2003. He has been UNESCO's consultant on science teaching, has been associated with the Hoshangabad Science Teaching Programme and has conducted workshops for children in more than 1,500 schools across the country.

He has written several books on science for children and translated several more. But, perhaps he is best know for making simple, inexpensive and educative toys from scrap and taking science out of sanitised labs and onto the level of the underprivileged child. Yet, the weight of all the laurels and recognition he has received rests gently on Arvind Gupta's head.

In Bangalore recently for a workshop organised by Sutradhar for primary school teachers teaching science, Gupta sat on the floor with the rest of his class with a plastic box in front of him filled with odds and ends - needle and thread, plastic straws, tetra packs, newspapers, broomsticks, cycle tubes, magnets, beads, rubber bands, what have you. Like a magician he proceeded to pick an ice-cream stick from here, a piece of twine from there and presto! a toy was born - simple in its makeup but profound in the scientific truth it had the potential to explain. Mesmerised adults could only look on child like wonder writ large on the faces. In between tinkering with these toys, Arvind Gupta spoke to Veena Pradeep. Here are excerpts based on the interaction.

What do you think is wrong with science teaching in our schools?

Teaching by rote, teaching without hands-on-experience, teaching that is not rooted in the child's reality. High sounding theories are threatening to the child. What does centrifugal force, aerodynamics etc mean to him? Mere words and intimidating ones at that. How can students learn complicated theories without first understanding the basics? Look at our government run science centres. Housing Western models and equipment that either don't work or are mere exhibits that can't be touched... and all of them gathering dust in an unfriendly environment. To top it all there's a gun-toting sentry to see that nobody breaks anything! Enough to put children off science, if you ask me.

Isn’t it also such a shame that a country of a billion people doesn’t have any popular science magazines?

Teachers complain that they work under limitations and many times without many resources... I agree that teachers are also victims of the mutilating system themselves. Although technically qualified with a degree to teach; many of them have probably never got their hands dirty by experimenting. But I don’t believe you need expensive equipment to teach. Fancy apparatus that you see gathering dust in school labs may actually alienate the child. Science is about improvisations, about using local resources, re-using material... So also math. It’s sad that our schools don’t have math labs. Why, if you wanted to you could easily teach fractions by folding and unfolding a piece of paper, weights using coins, geometry using matchsticks! Lack of resources does not hinder an inspired teacher. Their faith in the children’s ability to learn is enough. If you ask me, all the paraphernalia a child needs for scientific experiments should be able to fit into his pocket! The most expensive material that is needed is the child’s mind.

What is the role of toys in your method of teaching?

Children are more likely to appreciate a science principle if they can experience it in a toy. Toys appear less threatening too. Before children can understand a thing, they need to experience with their senses - see, touch, break, put together.. That is why I say the best thing a child can do with a toy is to break it, for then there is a chance of him learning how it works. Learning by experience sticks in the memory. When children learn mechanistically they forget. At our Science Centre, for three days a week 50 school children from around the area come to us. They have great fun making toys from the low cost material we provide them with. They are then allowed to take the toys they’ve made, home. Much before the advent of sexist and violent toys all children made their own toys from locally available material and had great fun doing so.

Do you explain the scientific principle behind your toys?

That would be a sure fire way of snuffing children’s interest in the activity. There is no need to explain the principle behind the toy. If at all we can help them discover it by themselves. Children should have fun with toys. High sounding explanations will spoil that fun. When a child’s curiosity is aroused she will find out how the toy works for herself. We must remember, children are capable of original knowledge. They are our teachers. We learn so much from them.

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